2015.0059

February 12, 2015

Ms. Sarah Cooksey
Administrator, Delaware Coastal Management Program
Department of Natural Resources
99 Kings Highway
Dover, DE 19901

RE: Coastal Zone Management Consistency Certification for GXT's 2D seismic survey off the U.S. Mid- and South Atlantic Coast.

Ms. Cooksey,

GXT plans to conduct a 2D marine seismic survey off the U.S. Mid- and South Atlantic Coast from July through December of 2015. The survey area runs from ~38.5ºN off Delaware to ~23.9ºN off Key West, Florida, and from 20 km from the coast to >600 km from the coast. The purpose of the proposed study is to collect seismic reflection data that provides a series of sub-bottom profiles used to assess the overall geological, including historical and structural, development of the Atlantic margin. Outcomes would include a clearer understanding of the overall basin architecture and resource potential as well as the potential for evolution of a petroleum system, including identification of potential source rocks, migration pathways, and play types. In order to conduct the survey, GXT has requested a Geological and Geophysical (G&G) permit from the Bureau of Ocean Energy Management (BOEM) pursuant to the Outer Continental Shelf Lands Act.

The Delaware Coastal Management Program (DCMP) submitted a letter to the National Oceanic and Atmospheric Administration Office for Coastal Management (NOAA OCM), dated September 4, 2014, requesting approval to review GXT's G&G permit application No. E14-003 to the BOEM as an unlisted activity under the Coastal Zone Management Act (CZMA) §307(c)(3)(A)(16 U.S.C. §1456(c)(3)(A)) and NOAA's regulations at 15 C.F.R. Part 930, Subpart D. On November 18, 2014, NOAA OCM granted approval for Delaware to review GXT's G&G permit application on the basis that the activity may have reasonably foreseeable effects on coastal uses pertaining to commercial and recreational fishing. In a letter dated December 12, 2014 and pursuant to 15 C.F.R. Part 930.56, GXT requested from the DCMP a copy of the federally approved enforceable policies of the coastal management program relevant to the effects approved for review by NOAA OCM. To date, the DCMP has not provided a response identifying specific approved enforceable policies of their coastal zone management program that are relevant to potential effects on commercial and recreational fisheries. In a follow-up phone conversation on January 16, 2015, GXT was advised that all enforceable policies of the program could be downloaded from the DCMP website.

This letter and the attached documents provide the DCMP with GXT's consistency certification for the planned seismic survey in Federal waters of the Mid- and South Atlantic of the United States pursuant to 15 C.F.R. Part 930.57-58.

Based on a review of the proposed activity's conformance with the enforceable policies of the state of Delaware's federally approved Coastal Management Program pertaining to reasonably foreseeable potential effects on commercial and recreational fisheries, GXT has determined that the proposed activity complies with the enforceable policies of Delaware's approved management program and will be conducted in a manner consistent with such program.

I hope that the materials provided below and in the attachments are helpful in evaluating any potential reasonably foreseeable effects on commercial and recreational fisheries within the states' coastal zone.

Sincerely,

Dan Virobik

Dan Virobik

Coastal Zone Management Act Consistency Certification
Necessary Data and Information

Federal Permit Application and Supporting Materials

A copy of the GXT application for G&G Activities, including relevant attachments, submitted to the BOEM is appended as Attachment 1 to this letter.

Description of the Proposed Activity

Overview

GXT plans to conduct a 2D marine seismic survey off the U.S. southeast coast from ~38.5°N off Delaware to ~23.9°N off Key West, Florida, and from 20 km from the coast to >600 km from the coast (Fig. 1). The survey is planned to be conducted from July through December of 2015. The survey will involve one source/streamer vessel, the M/V *Discoverer*, and one support vessel. The seismic source to be deployed from the *Discoverer* is a 36 air chamber array with a total volume of 6420 in^3. Within the survey area there will be five widely-spaced transect lines roughly parallel to the coast and 16 widely-spaced transect lines in the onshore-offshore direction totaling ~13,556 km of survey lines. Most of this effort (~8517 km) will take place in water depths >1000 m, with less effort in water depths 100–1000 m (~3432 km) and <100 m (~1607 km). Most (~5980 km) of the deep-water survey will be in depths >3000 m. There will be limited additional operations associated with equipment testing, startup, line changes, and repeat coverage of any areas where initial data quality is sub-standard. No survey activities will take place in state waters and the nearest planned survey line to the coast of Delaware will be 47 miles offshore. Additionally, there will be no equipment deployed to the seabed as a part of this survey, so there will be no seafloor disturbance and no effects on benthic habitats or organisms.

The purpose of the proposed study is to collect seismic reflection data that provides a series of sub-bottom profiles used to assess the overall geological, including historical and structural, development of the Atlantic margin. Outcomes would include a clearer understanding of the overall basin architecture and resource potential as well as the potential for evolution of a petroleum system, including identification of potential source rocks, migration pathways, and play types. This is a privately-funded survey and all planned geophysical data acquisition activities will be conducted by GXT.

The vessel will be self-contained and the crew will live aboard the vessel during the entire survey, with 1-2 crew changes conducted at ports yet to be determined. The *Discoverer* will serve as the platform from which vessel-based Protected Species Observers (PSOs) will watch for marine mammals and sea turtles before and during source operations and request mitigation measures as required by federal permits and authorizations. A support vessel will assist the source vessel but will not introduce sounds into the water beyond those associated with normal vessel operations. Helicopter operations are not planned as a part of the seismic survey and would occur only in the case of an emergency.

Mitigation Measures

Mitigation measures that may be required during seismic surveys offshore of the U.S. mid- and south Atlantic coasts have been described in the G&G Activities Programmatic Environmental Impact Statement (PEIS) (BOEM 2014). GXT will implement all mitigation measures required by BOEM and NMFS as stipulated in issued permits or authorizations. These mitigation measures include, but are not limited to:

- Procedures for vessel strike avoidance;
- Observance of any established time-area closures;
- Use of ramp up procedures when beginning survey activities or starting a new survey line
- Use of Protected Species Observers (PSOs) to watch for marine mammals and sea turtles and power down or shut down the air chamber array should they be observed within the NMFS defined exclusion zone; and
- Use of a towed passive acoustic monitoring system during darkness or poor visibility conditions.

It is important to note that when seismic vessels have survey equipment in the water (air source arrays, seismic streamers, and associated gear) it is not always possible to change directions or shut down propulsion systems without causing substantial risks to the vessel, crew, and the environment. Thus, the implementation of some vessel strike avoidance measures will be performed to the extent practicable while ensuring crew and vessel safety. It is also useful to recall that, while surveying, the vessel will travel at ~4 knots, well below the recommended reduced speed of 10 kts. By implementing these mitigation measure and any others required by federal regulatory agencies, GXT believes effects from the seismic survey will be negligible in offshore locations where they activities occur as well as in near shore coastal areas of concern to North Carolina.

GXT's Experience

GXT has been conducting marine seismic surveys around the world for over 13 years. During this time, air source arrays have been operated along >340,000 km (or >211,300 mi) of survey lines in habitats ranging from the ice-covered waters off of Greenland to tropical waters off of Africa and Asia. While conducting these surveys, GXT personnel have observed no negative effects to marine mammals, sea turtles, or fishes. GXT has a successful history of working closely with federal, state, and local authorities as well as stakeholders of all types to address concerns related to our operations.

Maps, Diagrams, and Technical Data

Maps of all planned survey lines and those offshore of Delaware are provided as Attachment 2. The total distance of survey lines within 75 miles of Delaware's coast is 150 km, or 93 miles. At an average speed of 4 knots, survey activities along these lines would last a total of approximately 20 hours.

Vessel Description

The geophysical survey will be performed from the M/V *Discoverer* (Fig. 1), a vessel owned by Shanghai Offshore Petroleum Bureau and operated on behalf of ION. The *Discoverer* will tow a 36-air chamber array directly astern and a single hydrophone streamer up to 12 km long. The *Discoverer* has a length of 72.1 m, a beam of 16.0 m, a maximum draft of 6.5 m, and a gross tonnage of 2747. The ship is powered by two MLW-ALCO 251 V-12 diesel engines, each producing 2740 hp, which drive the two

variable-pitch propellers directly. The vessel also has two Brunvoll bow thrusters (600 hp each). The operation speed during seismic acquisition will be ~4 kt (~7.4 km/h). When not towing seismic survey gear, the *Discoverer* has a cruising speed of 9.5 kt (17.6 km/h) and a maximum speed of 10 kt (~18.5 km/h). The *Discoverer* will also serve as the platform from which vessel-based protected species observers (PSOs) will watch for marine mammals and sea turtles before and during airgun operations.

Figure 1. M/V *Discoverer*.

Energy Source Array Description

During the survey, the energy source array to be used will consist of 36 air chambers, with a total volume of ~6420 in^3. The array will consist of a mixture of Bolt 1500LL and sleeve air chambers ranging in volume from 40 in^3 to 380 in^3; the larger (300–380 in^3) air chambers are Bolt type, and the smaller (40–150 in^3) air chambers are sleeve type. The air chambers will be configured as four identical linear arrays or "strings" (Fig. 3). Each string will have nine air chambers; the first and last air chambers in the strings are spaced ~15.5 m apart. The four strings will be distributed across an approximate area of 34×15.5 m behind the *Discoverer* and will be towed ~50–100 m behind the vessel at 10-m depth below the surface. The firing pressure of the array will be 2000 psi. The air source array will fire every 50 m or 20–24 s, depending on exact speed of the vessel. Note that this is a longer interval than is typical of most industry seismic surveys. When fired, a brief (~0.1 s) pulse of sound is emitted by all air chambers nearly simultaneously. The air chambers will be silent during the intervening periods.

Because the actual source is a distributed sound source (36 air chambers) rather than a single point source, the highest sound levels measurable at any location in the water will be less than the nominal source level. In addition, the effective source level for sound propagating in near-horizontal directions will be substantially lower than the nominal source level applicable to downward propagation because of the directional nature of the sound from the air source array.

Air Source Array Specifications

Energy Source	Thirty-six 2000 psi air chambers of 40–380 in^3, in four strings each containing nine operating air chambers.
Source output (downward)	0-pk is 68.3 bar-m (257 dB re 1 μPa · m); pk-pk is 147.1 bar · m (263 dB)
Towing depth of energy source	10 m
Air discharge volume	~6420 in^3
Dominant frequency components	<175 Hz

Additional Information

In the letter from the DCMP dated September 4, 2014, requesting NOAA OCM approval to review GXT's proposed activity as an unlisted activity, concerns were identified related to potential impacts on fisheries resources, recreation and commercial fishing, marine invertebrates, sea turtles, and marine mammals. In approving Delaware's request to review GXT's planned survey, the NOAA OCM determined that reasonably foreseeable impacts may occur to commercial and recreational fisheries; therefore, the following section addresses potential impacts of the planned seismic survey on fisheries with reference to the BOEM PEIS for G&G Activities (BOEM 2014) for additional discussion of these topics.

Summary of Potential Effects of Air Source Sound on Fishes

Some studies have shown that various life stages of particular fish species can be physically affected by exposure to air source sound. In all of these cases, the fish subjects were exposed to sound levels that would not likely be encountered under natural conditions. Studies that demonstrated physical effects on fishes typically involved either captive juvenile/adult subjects that were unable to move away from the sound source or passive ichthyoplankton that were located within a few meters of the sound source. The focus of study related to the potential effects of exposure to air source sound on fishes has recently shifted to behavioral effects, particularly those that could result in a decrease in catch rate of the fishes. Fishes will exhibit both subtle and more overt behavioral changes in response to air source sound and these effects appear to be quite variable both between and within species. Generally, the behavioral effects are localized and temporary, but can result in short-term effect on catch rates.

The area of water in which sound energy produced by GXT's air source array, whether detected through particle motion or sound pressure, could have negative physiological or lethal impacts to various life stages of fish is likely to be within a few meters of the air source array. Adult fish are very likely to swim away from the air source array and avoid such impacts. No lethal impacts on adult fish have been observed as a result of seismic surveys. Fish eggs, larva, and some juvenile life-stages may not be able to swim away from the sound source and may occur within this distance; however, these impacts are expected to be minimal compared to the natural mortality experienced by most species at these life stages. For example, Saetre and Ona (1996) applied a "worst-case scenario" mathematical model to investigate the effects of seismic sound on fish eggs and larvae. They concluded that mortality rates caused by

exposure to seismic air source sound are so low compared to the natural mortality that the impact of seismic surveying on recruitment to a fish stock must be regarded as insignificant.

Behavioral responses to seismic surveys by adult fish that may temporarily affect catch rates in commercial or recreational fisheries have been documented in several studies (e.g. Skalski et al. 1992; Engås et al. 1993, 1996; Pickett et al. 1994; La Bella et al. 1996; Løkkeborg et al. 2012). Impacts to catch rates were both positive and negative and they varied by species and catch method. Studies that found effects on catch rates often involved repeated use of airguns in or near the same location over the course of many days to weeks, which will not be the case during the GXT survey. The very long and widely spaced survey lines planned for GXT's 2D survey means that the sound source will only briefly transit once through most locations. Where east-west and north-south oriented survey lines cross, the vessel will be present on two occasions, but its occurrence would likely be separated temporally by days to weeks, if not months. Many studies also report that fish behavior appears to return to normal quite rapidly after the sound source stops or moves away (Pearson et al. 1992; Stantulli et al. 1999; McCauley et al. 2000a,b; Fewtrell and McCauley 2012).

Maps in Attachment 2 show the location of all survey lines and those closest to the coast of Delaware. The total distance of survey lines within 75 miles of the Delaware coast is 150 km, or 93 miles. At an average speed of 4 knots, survey activities along these lines would last a total of approximately 20 hours. This total amount of survey activity may occur all at once or be split into two separate episodes separated by several weeks or months. Either way, any impacts on commercial or recreational fisheries caused through behavioral disturbance to adult fishes, if they occur at all, are expected to be transient and very brief. A safe distance between the survey vessel and fishing vessels and gear will need to be maintained. The support vessel will help to maintain this distance and will communicate with other vessels using radio broadcasts and the issuance of Notice to Mariners to avoid any conflicts with other users in the survey area.

Enforceable Policies of the Delaware Coastal Management Program

Pursuant to 15 C.F.R. Part 930.56, GXT requested from the DCMP a copy of the federally approved enforceable policies of the coastal management program relevant to the effects approved for review by NOAA OCM. No specific approved enforceable policies relevant to potential effects on commercial or recreation fisheries have been identified to GXT in response. In a follow-up phone call on January 16, 2015, the DCMP suggested that all enforceable policies of Delaware's Coastal Management Program could be downloaded from their website.

Coastal Management Program Objectives and Policies

Delaware's Coastal Management Program maintains a document titled "Comprehensive Update and Routine Program Implementation" which was last updated in June 2011. This document contains descriptions of the approved policies of Delaware's coastal management program and is periodically updated to reflect changes in Delaware's environmental laws and regulation as well as activities affecting coastal uses and resources. Section 5.11 "Living Resources" includes subsections describing policies related to the protection of fish and wildlife as well as nongame and endangered species. These are primarily concerned with giving responsibility and enforcement authority to the state agency (Department of Natural Resources and Environmental Control) for protecting, managing and conserving protected wildlife, including fish and game regulations, and for encouraging the preservation of nongame wildlife

and habitat. For reasons described above and due to the very brief and transitory nature of survey activities greater than 47 miles from the coast of Delaware, no significant impacts to fish and game resources or coastal uses (commercial and recreational fisheries) are expected. Therefore, we find that the planned survey activities are consistent with the relevant enforceable policies of Delaware's coastal zone management program.

Conclusions

The proposed survey activities will take place greater than 47 miles from state waters. Due to the brief and transitory nature of the survey activities offshore of Delaware, no significant impacts are likely to occur to coastal uses, including commercial and recreational fisheries. Based on a review of the proposed activity's conformance with the enforceable policies of the state of Delaware's federally approved Coastal Management Program pertaining to reasonably foreseeable potential effects on commercial and recreational fisheries, GXT has determined that the proposed activity complies with the enforceable policies of Delaware's approved management program and will be conducted in a manner consistent with such program.

Literature Cited

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Attachment 1 – G&G Permit Application

OMB Control Number: 1010-0048
OMB Approval Expires: 1/31/15

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT
Gulf of Mexico OCS Region
(Insert Appropriate Regional Office)

Requirements for Geological and Geophysical Explorations or Scientific Research on the Outer Continental Shelf

Application for Permit to Conduct Geological or Geophysical Exploration for Mineral Resources or Scientific Research on the Outer Continental Shelf
(Attachment 1)

Nonexclusive Use Agreement for Scientific Research
(Attachment 2)

SUBMIT: Original plus three copies, totaling four copies, which include one digital copy and one public information copy (all with original signatures).

Paperwork Reduction Act of 1995 (PRA) Statement: The PRA (44 U.S.C. 3501 et seq.) requires us to inform you that the Bureau of Ocean Energy Management (BOEM) collects this information to evaluate applications for permits to conduct pre-lease exploration offshore and to monitor activities of scientific research conducted under notices. BOEM uses the information to ensure there is no environmental degradation, personnel harm, damage to historical or cultural sites, or interference with other uses. Responses are mandatory or to obtain or retain a benefit. Proprietary information is protected in accordance with standards established by the Federal Oil and Gas Royalty Management Act of 1982 (30 U.S.C. 1733), the Freedom of Information Act (5 U.S.C. 552(1), (4)), and Department regulations (43 CFR 2). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid Office of Management and Budget control number. The reporting burden for this form is estimated to average 3 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Bureau of Ocean Energy Management, 381 Elden Street, Herndon, VA 20170.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT

REQUIREMENTS FOR GEOLOGICAL AND GEOPHYSICAL EXPLORATIONS OR SCIENTIFIC RESEARCH ON THE OUTER CONTINENTAL SHELF

Authority

You must perform all geological and geophysical explorations or scientific research activities authorized and conducted in the Outer Continental Shelf (OCS) according to the OCS Lands Act, 30 CFR Parts 251, 551, and other applicable Federal statutes and regulations, and amendments thereto.

General Requirements of Permits and Notices

You must conduct geological and geophysical activities for mineral exploration or scientific research activities authorized under 30 CFR Parts 251 and 551 so that those activities do not:

A. Interfere with or endanger operations under any lease or right-of-way or permit issued or maintained pursuant to the OCS Lands Act;
B. Cause harm or damage to aquatic life or to the marine, coastal, or human environment;
C. Cause pollution;
D. Create hazardous or unsafe conditions;
E. Unreasonably interfere with or harm other uses of the area; or
F. Disturb archaeological resources.

Any person conducting geological or geophysical activities for mineral exploration or scientific research under 30 CFR Parts 251 and 551 must immediately report to the Director, BOEM:

A. Detection of hydrocarbon occurrences;
B. Encounters of environmental hazards that constitute an imminent threat to human activity; or
C. Activities that adversely affect the environment, aquatic life, archaeological resources, or other uses of the area in which the exploration or scientific research activities are conducted.

Any person conducting shallow or deep stratigraphic test drilling activities under a permit for mineral exploration or scientific research under 30 CFR Parts 251 and 551 must utilize the best available and safest technologies that BOEM determines to be economically feasible.

The authorization that BOEM grants you under 30 CFR Parts 251 and 551 to conduct geological and geophysical explorations for minerals or for scientific research does not confer a right to any discovered oil, gas, or other minerals, or to a lease under the OCS Lands Act.

Time Restriction for Permits and Notices

Permitted activities approved for a specified period, including requests for extensions, and activities under a notice may not exceed 1 year.

Geological and Geophysical Activities Requiring Permits and Notices

Geological and Geophysical Explorations for Mineral Resources

You may not conduct geological and geophysical explorations for mineral resources in the OCS without an approved permit unless you conduct such activities pursuant to a lease issued or maintained under the OCS Lands Act. You must obtain separate permits for either geological or geophysical explorations for mineral resources. If BOEM disapproves an application, the statement of rejection will state the reasons for the denial and will advise the applicant of those changes needed to obtain approval.

Geological and Geophysical Scientific Research

You may not conduct geological and geophysical scientific research related to oil, gas, and sulphur in the OCS without an approved application for permit or filing of a notice. You must obtain separate permits for geological and geophysical scientific research that involves the use of solid or liquid explosives or the drilling of a deep stratigraphic test. If BOEM disapproves an application for permit, the statement of rejection will state the reasons for the denial and will advise the applicant of the changes needed to obtain approval.

You must file a notice with the BOEM at least 60 days before you begin scientific research not requiring a permit. We may inform you of all environmental laws and regulations pertaining to the OCS.

Information Required for Permits

Each applicant for a permit must complete the applicable sections of the Application for Permit (Attachment 1) and must include a public-information, page-size plat(s) showing the location of the proposed area of activity (Section B.2 or C.2). In addition, each applicant for a geological or geophysical permit must submit the appropriate attachment to section D of the application. This includes a detailed map of the proposed activity for Section D.8 (Geological Application) or Section D.12 (Geophysical Application). Only applicants for a notice of scientific research must complete a Nonexclusive Use Agreement (Attachment 2).

The information provided on the Application for Permit (excluding section D) and on the Nonexclusive Use Agreement, including continuation sheets and the page-size plat(s), is considered NON-PROPRIETARY INFORMATION. These non-proprietary portions of the application constitute the "public information" copy of Form BOEM-0327 and with the executed permit will be available to the public upon request.

The information listed in section D is considered PROPRIETARY INFORMATION and you should NOT attach it to the public information copy. BOEM will not make this information available to the public without the consent of the potential permittee or for a period mandated by law or regulation. However, BOEM may determine that earlier release is necessary for the proper development of the area permitted.

Modifications to Approved Permits

The BOEM Regional Supervisor must approve any modification to the permitted operations.

Filing Locations for Permits to Conduct Explorations for Mineral Resources and for Permits or Notices to Conduct Scientific Research

File each notice or application for a permit with an original plus three copies, totaling four copies, which include one digital copy and one public information copy (all with original signatures) at the following locations at least 60 days before you begin operations:

A. For the OCS off the State of Alaska:

Regional Supervisor for Resource Evaluation
Bureau of Ocean Energy Management
Alaska OCS Region
3801 Centerpoint Drive
Suite #500
Anchorage, Alaska 99503-5823

B. For the OCS in the Gulf of Mexico and off the Atlantic Coast:

Regional Supervisor for Resource Evaluation
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

C. For the OCS off the States of California, Oregon, Washington, or Hawaii:

Regional Supervisor, Office of Strategic Resources Bureau of Ocean Energy Management
Pacific OCS Region
770 Paseo Camarillo
Camarillo, California 93010-6092

Attachment 1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT

Gulf of Mexico OCS Region
(Insert Appropriate Regional Office)

APPLICATION FOR PERMIT TO CONDUCT GEOLOGICAL OR GEOPHYSICAL EXPLORATION FOR MINERAL RESOURCES OR SCIENTIFIC RESEARCH ON THE OUTER CONTINENTAL SHELF

(Section 11, Outer Continental Shelf Lands Act of August 7, 1953, as amended on September 18, 1978, by Public Law 95-372, 92 Statute 629, 43 U.S.C. 1340; and 30 CFR Parts 251 and 551)

GX Technology Corporation
Name of Applicant

2105 City West Boulevard, Suite 900
Number and Street

Houston, TX 77042
City, State, and Zip Code

Application is made for the following activity: (check one)

_____Geological exploration for mineral resources

_____Geological scientific research

__X__ Geophysical exploration for mineral resources

_____Geophysical scientific research

Submit: Original plus three copies, totaling four copies, which include one digital copy, and one public information copy.

To be completed by BOEM

Permit Number: _____ **Date:** _____

A. General Information

1. The activity will be conducted by:

Cobra Energy Services Service Company Name	For GX Technology Corporation Purchaser(s) of the Data
10550 Bissonnet, Suite 100 Address	2105 CityWest Blvd, Suite 900 Address
Houston, TX 77099 City, State, Zip	Houston, TX 77042 City, State, Zip
713-728-6266 Telephone/FAX Numbers	281-781-1026 Telephone/FAX Numbers
marcusp@greyco.net E-Mail Address	dan.virobik@iongeo.com E-Mail Address

2. The purpose of the activity is: X Mineral exploration

   _____ Scientific research

3. Describe your proposed survey activities (i.e., vessel use, benthic impacts, acoustic sources, etc) and describe the environmental effects of the proposed activity, including potential adverse effects on marine life Describe what steps are planned to minimize these adverse effects (mitigation measures). For example: 1) Potential Effect; Excessive sound level Mitigation; Soft Start, MMOs, mammal exclusion zone or 2) Potential Effect; Bottom disturbance; Mitigation; ROV deployment/retrieval of bottom nodes) (use continuation sheets as necessary or provide a separate attachment):
   2D Seismic Survey using a single airgun array source. No adverse effect on the environment. We follow the IAGC guidelines for marine mammal mitigation (plan includes soft starts for the source and onboard MMO's/PAM operators).

4. The expected commencement date is: November 1st, 2014

   The expected completion date is: May 1st, 2015

5. The name of the individual(s) in charge of the field operation is:
   Dan Virobik

   May be contacted at:
   GX Technology

   Telephone (Local) 281-781-1026 (Marine) +1-480-765-2500

   Email Address: dan.virobik@iongeo.com Radio call sign C6CZ2

6. The vessel(s) to be used in the operation is (are):

Name (s)	Registry Number(s)	Registered owners)
M/V Discoverer	711122	Shanghai Offshore Petroleum Bureau

7. The port from which the vessel(s) will operate is: Norfolk, Va & Charleston, SC

8. Briefly describe the navigation system (vessel navigation only):
Furuno GPS Navigator GP-150, Furuno 951 EchoSounder, Simrad AP50 Auto-Pilot, Simrad GC80 Gyrocompass.

B. Complete for Geological Exploration for Mineral Resources or Geological Scientific Research

1. The type of operation(s) to be employed is: (check one)

   (a) _____ Deep stratigraphic test, or

   (b) _____ Shallow stratigraphic test with proposed total depth of _____. or

   (c) _____ Other _____

2. Attach a page-size plat showing: 1) The generalized proposed location for each test, where appropriate, a polygon enclosing the test sites may be used, 2) BOEM protraction areas; coastline; point of reference; 3) Distance and direction from a point of reference to area of activity.

C. Complete for Geophysical Exploration for Mineral Resources or Geophysical Scientific Research

1. The type(s) of operation(s) to be employed is (are):
   a) Acquisition method (OBN, OBC, Streamer): Streamer
   b) Type of acquisition: (High Resolution Seismic, 2D Seismic, 3D Seismic, gravity, magnetic, CSEM, etc.)
   2D Seismic, Gravity and Towed Magnetics.

2. Attach a page-size plat showing:
   a) The generalized proposed location of the activity with a representative polygon,
   b) BOEM protraction areas; coastline; point of reference,
   c) Distance and direction from a point of reference to area of activity.

3. List all energy source types to be used in the operation(s): (Air gun, air gun array(s), sub-bottom profiler, sparker, towed dipole, side scan sonar, etc.).

Single Air Gun Array consisting of 4 gunstrings . see attachment for a more detailed description of the energy source to be used.

4. Explosive charges will _____ will not XX be used. If applicable, indicate the type of explosive and maximum charge size (in pounds) to be used:

   Type _____ Pounds _____ Equivalent Pounds of TNT _____

D. Proprietary Information Attachments

Use the appropriate form on page 9 for a "geological" permit application or the form on page 11 for a "geophysical" permit application. You must submit a separate Form BOEM-0327 to apply for each geological or geophysical permit.

E. Certification

I hereby certify that foregoing and attached information are true and correct.

Print Name: Daniel Virobik

SIGNED Daniel Virobik **DATE** March 26th, 2014

TITLE Marine Operations Supervisor

COMPANY NAME: GX Technology

TO BE COMPLETED BY BOEM

Permit No._____ **Assigned by** _____ **Date** _____
of BOEM

This application is hereby:

a. _____ Accepted

b. _____ Returned for reasons in the attached

SIGNED _____ **TITLE** Regional Supervisor **DATE** _____

Section D Proprietary Information Attachment
Required for an Application for Geological Permit

1. Description of proposed coring, drilling or sampling method. Include heat flow measurements and depth of penetration.

2. Description of coring, drilling or sampling equipment to be used:

3. List proposed coring, drilling or sample location(s) with their latitude and longitude coordinates and the total number of samples to be acquired. These locations may be sent digitally on a CD. (Attach separate page if necessary):

4. Navigation system or method to be used to position sample locations:

5. Method of sample storage, and handling:

6. List each test to be conducted on the samples with a brief description of its objective:

7. Estimated date on which samples, logs, and analyzed and/or processed data will be ready for inspection:

8. Attach map(s), plat(s), and chart(s) (preferably at a scale of 1:250,000) and/or an electronic version of same showing latitude and longitude, scale, protraction areas, specific block numbers, and specific sample location(s) in latitude(s) and longitude(s) for each of the proposed sample site(s). The map, plat or chart should be submitted at a sufficient size and scale to make out all details of the activities shown. Along with the hardcopy map, submit on CD, the ArcGIS shape files needed to reproduce the map of the proposed sample site(s) including individual site names in the attribute table.

Section D Proprietary Information Attachment
Required for an Application for Geophysical Permit

1. Detailed narrative, modeling of sound propagation, and visual description of the energy source(s) and streamer(s) (receiving array): see attachments for source modeling and streamer configuration

2. Attach a map view diagram to demonstrate vessel(s) source and receiver(s) configuration. Label each vessel indicating its function and include the dimensions of streamer(s), tow fish, etc. Indicate the number of chase and alternate vessels to be used.
   See attachments for diagram of source and receiver configuration. 1 support vessel is planned for this project.

3 List each energy source to be used (e.g., airgun, airgun array(s), sparker, towed dipole, side scan sonar, sub bottom profiler, etc.). Indicate the source's manufacturer, model, total energy output per impulse in dB (RMS), peak to peak in db, frequency in Hz (if applicable) etc.

Energy Source	Manufacturer	Model	Gun Size (cu. in.)	Total Energy Output Peak to Peak in db, Amp, etc.	Total Energy Output rms in db	Frequency (Hz-kHz range)
Air Gun	RTS	Big Shot	6420	147.1 bar m	215 db	2-160 Hz

4. Shot (energy pulse) frequency per linear mile (statute): 37

5. Towing depth (ft/m) of the energy source: 10 meters

6. Towing depth (ft/m) of the receiver(s): 15 meters

7. CSEM, OBN, Magnetotelluric, and OBC surveys: Describe the node deployment and retrieval procedures. Indicate the location (latitude and longitude coordinates), number and spacing of any ocean bottom receivers, cables, and anchors. If anchors will not be retrieved, provide their physical composition and rate of decomposition. Location data may be submitted digitally on a CD (attach separate page if necessary).

   NA

8. Navigation/positioning system or method used to position shotpoint locations and or ocean bottom receivers:
Concept Systems Spectra Navigation Software and CNAV DGPS

9. Proposed areal extent (blocks) for 3D surveys or total number of line miles proposed for 2D or high resolution survey: 8423 Miles of 2D

10. Provide the company identification name of the proposed survey (e.g. Deep Six Survey). List all proposed initial and final processed data sets that will result from acquisition under this activity (e.g. 3D Time Migration processed as Kirchhoff Depth Migration, Wave Equation Migration, etc).

Survey name is USAMSPAN.
Final Pre-Stack Time and Pre-stack Depth Migrated data, Gravity & Magnetic data.

11. Estimated date (month and year) on which initial and final processing will be available for all proposed processed data sets:
July 2016

12. Attach map(s), plat(s), and chart(s) (preferably at a scale of 1:250,000) and an electronic version of same showing latitude and longitude, scale, specific protraction areas, block numbers. The map, plat or chart should be submitted at a sufficient size and scale to make out all details of the activities shown. For 2D data acquisition provide specific track lines with line identifications with the total number of line miles proposed or a representative polygon and total number of blocks for 3D surveys. Along with the hardcopy map, submit on CD, the necessary ArcGIS shape files to reproduce the map for 2D track lines including individual line names in the attribute table. For 3D surveys provide a representative polygon as an ArcGIS shape file.

Attachment 2

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT

_____
(Insert Appropriate Regional Office)

NONEXCLUSIVE USE AGREEMENT FOR SCIENTIFIC RESEARCH ON THE OUTER CONTINENTAL SHELF

A. State the time and manner in which data and information resulting from the proposed activity will be made available to the public for inspection and reproduction, such time being the earliest practicable time.

_____

_____

_____

_____

_____

B. _____ (applicant) agrees that the data and information resulting from the proposed activity will not be sold or withheld for exclusive use.

_____
(Signature of Applicant)

_____
(Type or Print Name of Applicant)

_____
(Title)

_____
(Date)

Submit: Original plus three copies, totaling four copies, which include one digital copy and one public information copy (all with original signatures).

2D MARINE SEISMIC AIRGUN ARRAY for USAMSPAN

Revision History of this Document

Rev No	Effective Date	Description	Prepared by (name)	Reviewed by (name)
Draft	03/24/2014	Initial Development	C. Schneider	
01				
02				
03				
04				
Latest revision approved by:			**Signed:**	

Distribution List

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Copy No. 11	
Copy No. 12	
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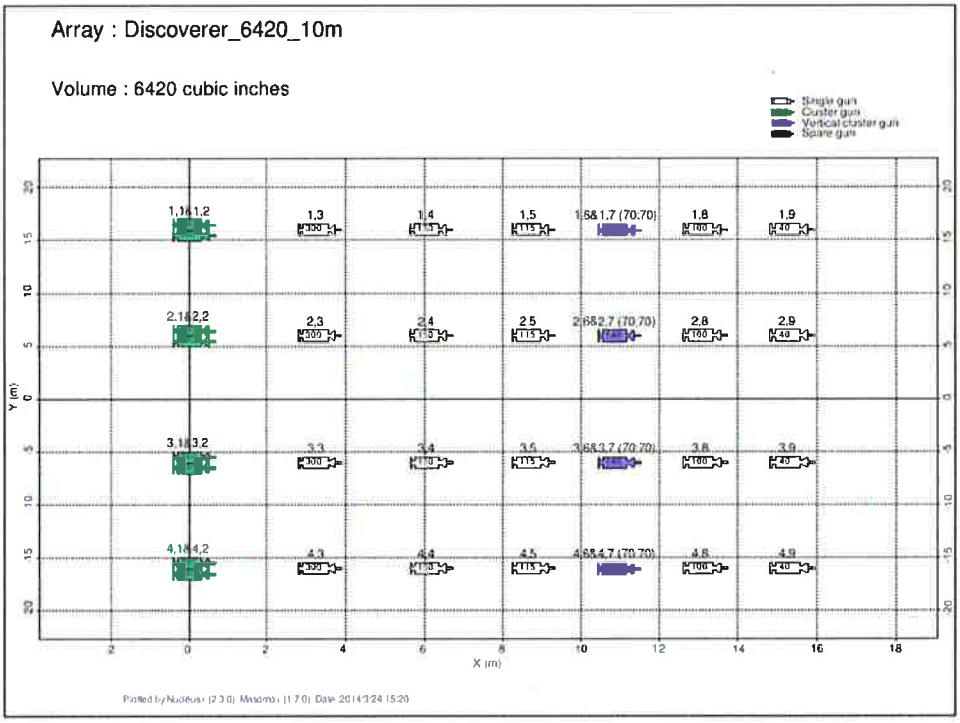
Archive	GXT SharePoint Directory

Vessel:	M/V Discoverer
Source Array Volume:	6420 cubic inch
Air Pressure:	2000 psi
Average Gun Depth:	10 m
Average Cable Depth:	15 m
Modeling Software:	**Nucleus+ ver. 2.3.0** **Marine Source Modeling ver. 1.7.0**
Modeling Parameters:	**Sea Temperature = 10 °C** **Water Velocity = 1490.0 m/s**



SOURCE ARRAY PARAMETERS :

Dataset : Discoverer_6420_10m

Number of subarrays : 4
Total number of guns : 36
Total chamber volume : 6420.0
Effective volume : 6420.0

Subarray number : 1
Number of guns : 9
Subarray volume : 1605.0

GUN	TYPE	X	Y	Z	Volume	Pressure	Delay	Wkit	CluNo	Activ	Group
1	Bolt 1500 LL airgun	0.00	16.50	10.00	380.0	2000.0	0.0	1.0	1	1	1
2	Bolt 1500 LL airgun	0.00	15.50	10.00	380.0	2000.0	0.0	1.0	1	1	1
3	Bolt 1500 LL airgun	3.25	16.00	10.00	300.0	2000.0	0.0	1.0	0	1	1
4	Sleeve gun	6.05	16.00	10.00	150.0	2000.0	0.0	1.0	0	1	1
5	Sleeve gun	8.65	16.00	10.00	115.0	2000.0	0.0	1.0	0	1	1
6	Sleeve gun	10.85	16.00	9.65	70.0	2000.0	0.0	1.0	2	1	1
7	Sleeve gun	10.85	16.00	10.35	70.0	2000.0	0.0	1.0	2	1	1
8	Sleeve gun	13.05	16.00	10.00	100.0	2000.0	0.0	1.0	0	1	1
9	Sleeve gun	15.25	16.00	10.00	40.0	2000.0	0.0	1.0	0	1	1

Subarray number : 2
Number of guns : 9
Subarray volume : 1605.0

GUN	TYPE	X	Y	Z	Volume	Pressure	Delay	Wkit	CluNo	Activ	Group
1	Bolt 1500 LL airgun	0.00	6.50	10.00	380.0	2000.0	0.0	1.0	3	1	1
2	Bolt 1500 LL airgun	0.00	5.50	10.00	380.0	2000.0	0.0	1.0	3	1	1
3	Bolt 1500 LL airgun	3.25	6.00	10.00	300.0	2000.0	0.0	1.0	0	1	1
4	Sleeve gun	6.05	6.00	10.00	150.0	2000.0	0.0	1.0	0	1	1
5	Sleeve gun	8.65	6.00	10.00	115.0	2000.0	0.0	1.0	0	1	1
6	Sleeve gun	10.85	6.00	9.65	70.0	2000.0	0.0	1.0	4	1	1
7	Sleeve gun	10.85	6.00	10.35	70.0	2000.0	0.0	1.0	4	1	1
8	Sleeve gun	13.05	6.00	10.00	100.0	2000.0	0.0	1.0	0	1	1
9	Sleeve gun	15.25	6.00	10.00	40.0	2000.0	0.0	1.0	0	1	1

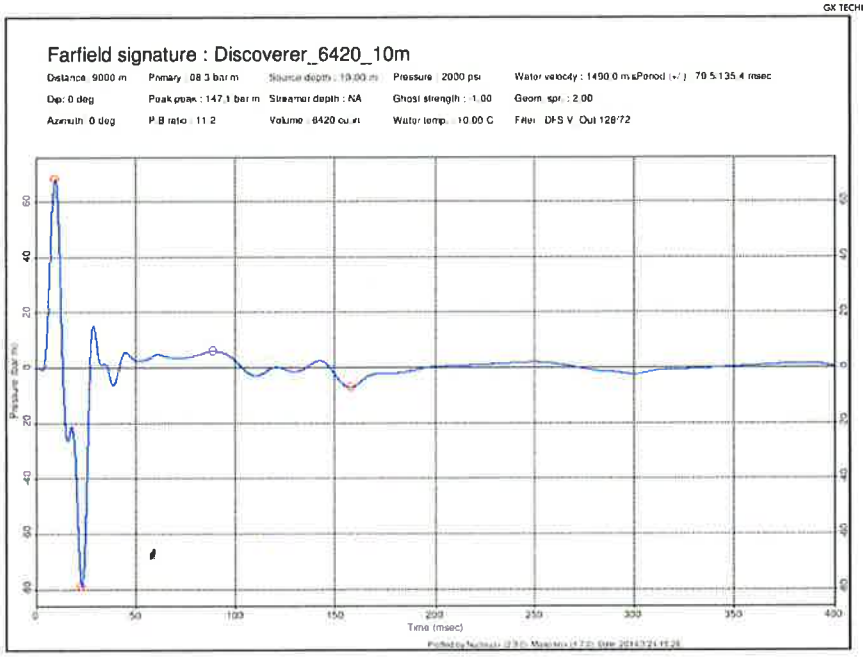
Subarray number : 3
Number of guns : 9
Subarray volume : 1605.0

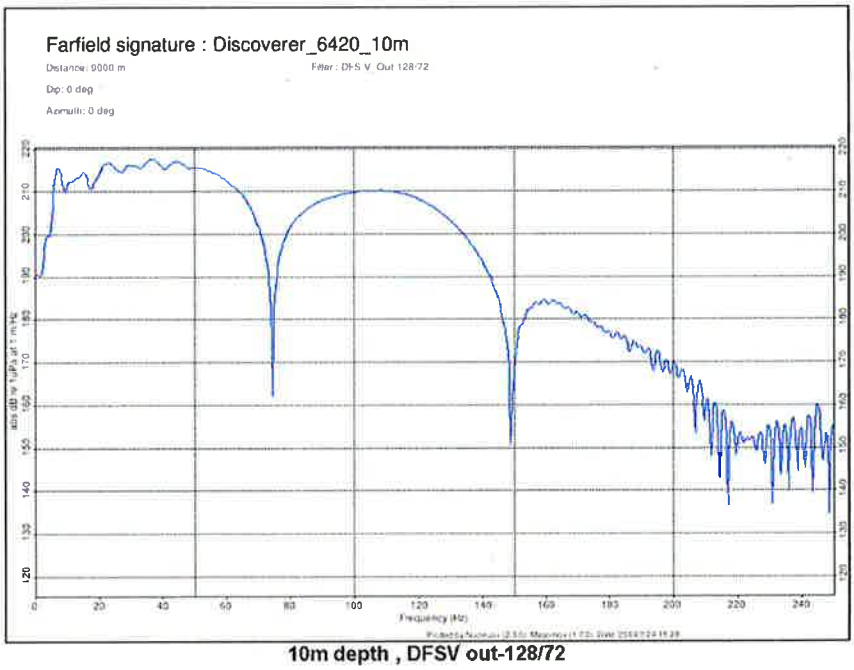
GUN	TYPE	X	Y	Z	Volume	Pressure	Delay	Wkit	CluNo	Activ	Group
1	Bolt 1500 LL airgun	0.00	-5.50	10.00	380.0	2000.0	0.0	1.0	5	1	1
2	Bolt 1500 LL airgun	0.00	-6.50	10.00	380.0	2000.0	0.0	1.0	5	1	1
3	Bolt 1500 LL airgun	3.25	-6.00	10.00	300.0	2000.0	0.0	1.0	0	1	1
4	Sleeve gun	6.05	-6.00	10.00	150.0	2000.0	0.0	1.0	0	1	1
5	Sleeve gun	8.65	-6.00	10.00	115.0	2000.0	0.0	1.0	0	1	1
6	Sleeve gun	10.85	-6.00	9.65	70.0	2000.0	0.0	1.0	6	1	1
7	Sleeve gun	10.85	-6.00	10.35	70.0	2000.0	0.0	1.0	6	1	1
8	Sleeve gun	13.05	-6.00	10.00	100.0	2000.0	0.0	1.0	0	1	1
9	Sleeve gun	15.25	-6.00	10.00	40.0	2000.0	0.0	1.0	0	1	1

Subarray number : 4
Number of guns : 9
Subarray volume : 1605.0

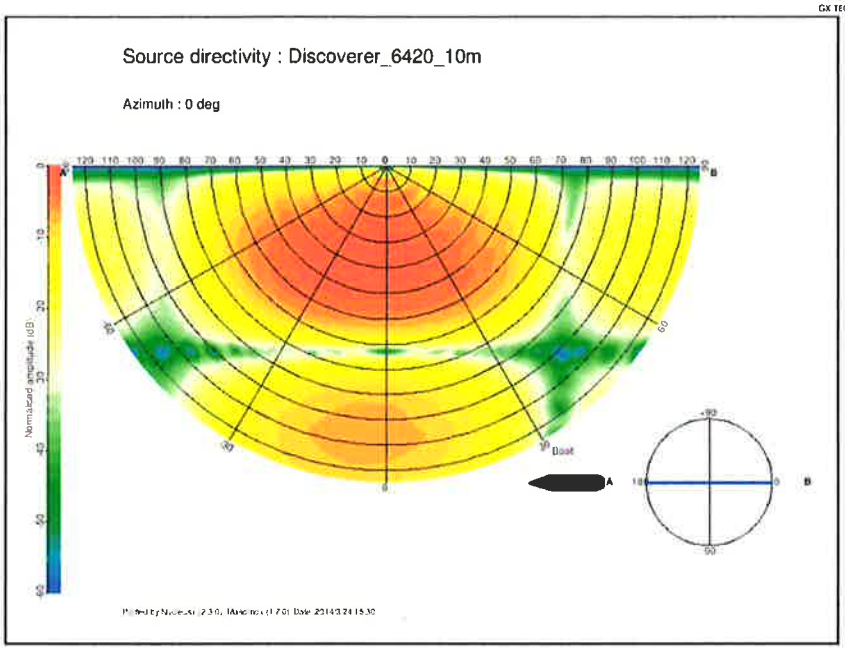
GUN	TYPE	X	Y	Z	Volume	Pressure	Delay	Wkit	CluNo	Activ	Group
1	Bolt 1500 LL airgun	0.00	-15.50	10.00	380.0	2000.0	0.0	1.0	7	1	1
2	Bolt 1500 LL airgun	0.00	-16.50	10.00	380.0	2000.0	0.0	1.0	7	1	1
3	Bolt 1500 LL airgun	3.25	-16.00	10.00	300.0	2000.0	0.0	1.0	0	1	1
4	Sleeve gun	6.05	-16.00	10.00	150.0	2000.0	0.0	1.0	0	1	1
5	Sleeve gun	8.65	-16.00	10.00	115.0	2000.0	0.0	1.0	0	1	1
6	Sleeve gun	10.85	-16.00	9.65	70.0	2000.0	0.0	1.0	8	1	1
7	Sleeve gun	10.85	-16.00	10.35	70.0	2000.0	0.0	1.0	8	1	1
8	Sleeve gun	13.05	-16.00	10.00	100.0	2000.0	0.0	1.0	0	1	1
9	Sleeve gun	15.25	-16.00	10.00	40.0	2000.0	0.0	1.0	0	1	1

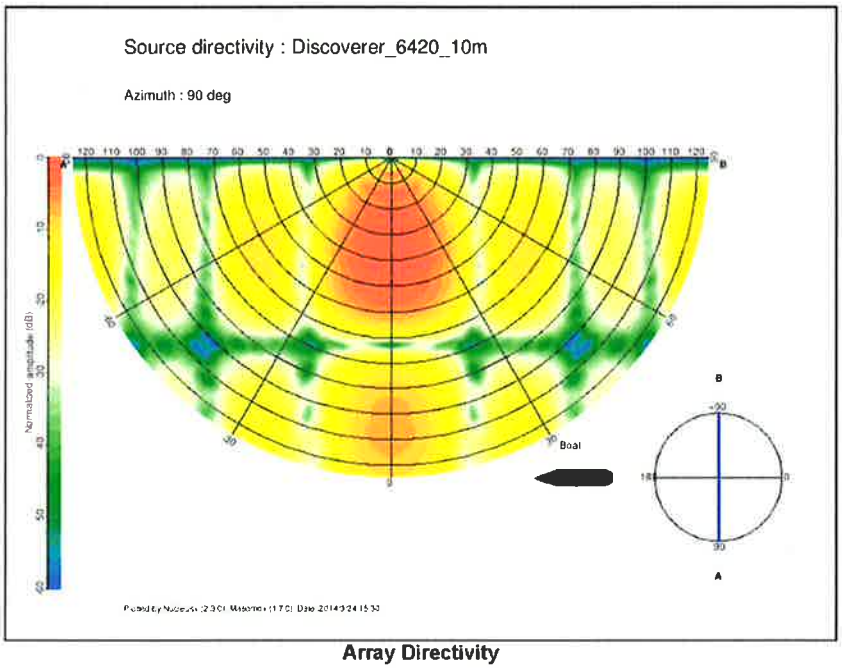
Units :
Coordinates : meter
Chamber volume : cubic inch
Chamber pressure : psi
Firing delay : ms





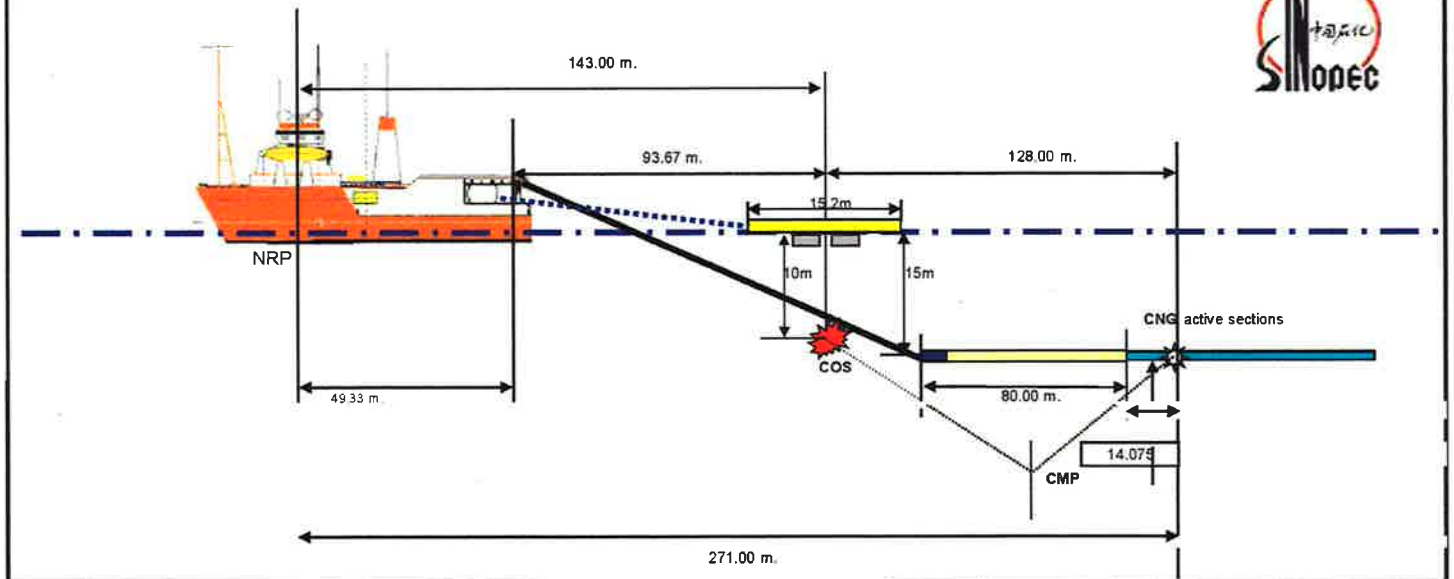
10m depth , DFSV out-128/72





Array Directivity

M/V Discoverer Towing Dimensions/Offset Diagram

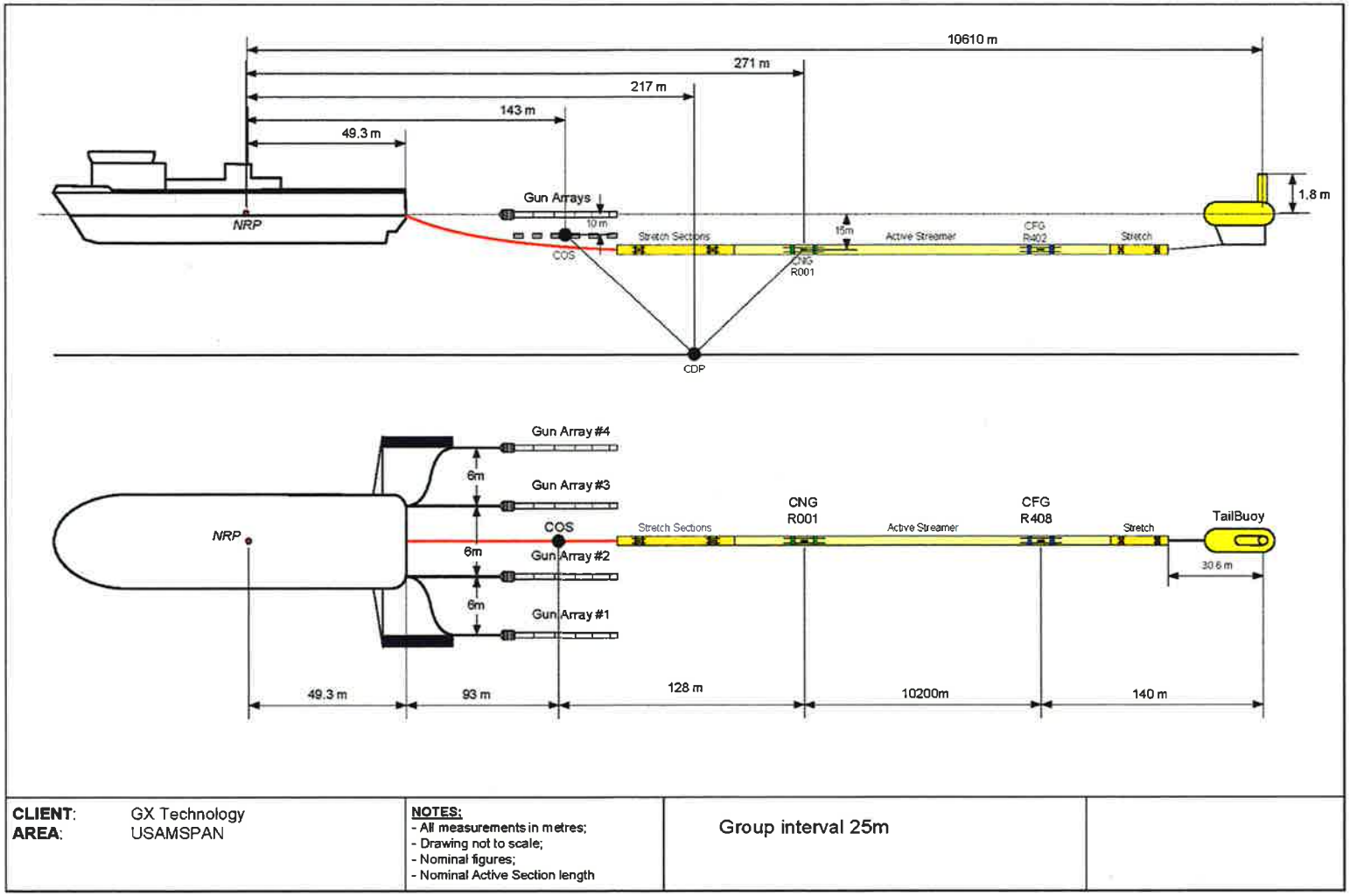


Principal Distances:			Principal Offsets:	
NRP-Stern	49.33 m.		COS-CNG	128.00 m.
Stern-COS	93.67 m.		Stern-CNG	221.67 m.
NRP-COS	143.00 m.		NRP-CNG	271.00 m.

Key:	comments
NRP	Navgation reference point (centre of mast @ sea level)
COS	Centre of source
CNG	Centre of near group (Trace # 1)
CMP	Common Middle Point

Towing Offset Diagram

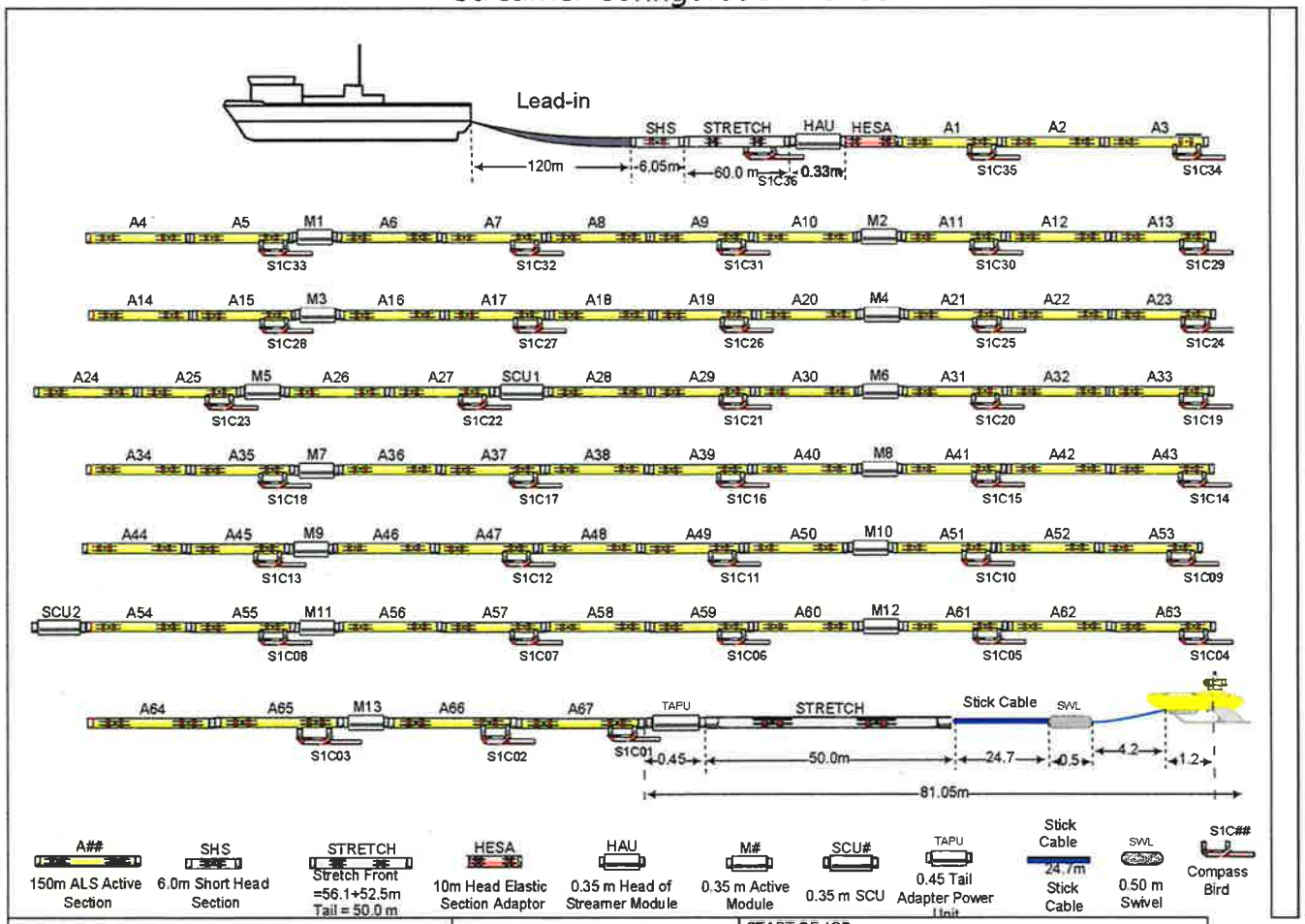
M/V Discoverer



CLIENT: GX Technology **AREA**: USAMSPAN	**NOTES:** - All measurements in metres; - Drawing not to scale; - Nominal figures; - Nominal Active Section length	Group interval 25m	

Streamer Configuration 10200m

M/V Discoverer



CLIENT: GX Technology **AREA:** USAMSPAN	**NOTES:** - All measurements in metres; - Drawing not to scale; - Nominal figures; - Nominal Active Section length	START OF JOB